

## Complete Summary

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### **GUIDELINE TITLE**

Guidelines for field triage of injured patients. Recommendations of the National Expert Panel on Field Triage.

### **BIBLIOGRAPHIC SOURCE(S)**

Sasser SM, Hunt RC, Sullivent EE, Wald MM, Mitchko J, Jurkovich GJ, Henry MC, Salomone JP, Wang SC, Galli RL, Cooper A, Brown LH, Sattin RW, National Expert Panel on Field Triage, Centers for Disease Control and Prevention. Guidelines for field triage of injured patients. Recommendations of the National Expert Panel on Field Triage. MMWR Recomm Rep 2009 Jan 23;58(RR-1):1-35. [160 references]  
[PubMed](#)

### **GUIDELINE STATUS**

This is the current release of the guideline.

## COMPLETE SUMMARY CONTENT

SCOPE  
METHODOLOGY - including Rating Scheme and Cost Analysis  
RECOMMENDATIONS  
EVIDENCE SUPPORTING THE RECOMMENDATIONS  
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS  
QUALIFYING STATEMENTS  
IMPLEMENTATION OF THE GUIDELINE  
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT  
CATEGORIES  
IDENTIFYING INFORMATION AND AVAILABILITY  
DISCLAIMER

## SCOPE

### **DISEASE/CONDITION(S)**

Injury in the field

### **GUIDELINE CATEGORY**

Evaluation  
Management  
Risk Assessment

### **CLINICAL SPECIALTY**

Emergency Medicine  
Geriatrics  
Nursing  
Pediatrics  
Surgery

## **INTENDED USERS**

Advanced Practice Nurses  
Allied Health Personnel  
Emergency Medical Technicians/Paramedics  
Hospitals  
Nurses  
Physician Assistants  
Physicians  
Public Health Departments

## **GUIDELINE OBJECTIVE(S)**

- To assist emergency medical service (EMS) providers with field triage – the identification of those patients who are at greatest risk for severe injury and determination of the most appropriate facility to which to transport persons with different injury types and severities – and medical management
- To assist EMS providers in making the critical decisions necessary to increase the likelihood of favorable outcomes for patients
- To revise the 1999 Decision Scheme for Field Triage

## **TARGET POPULATION**

People who sustain traumatic injuries in the field

## **INTERVENTIONS AND PRACTICES CONSIDERED**

### **Field Triage Decision Scheme for Trauma Center Transport**

1. Step one: assessment of the following physiologic criteria:
  - Glasgow coma scale
  - Systolic blood pressure
  - Respiratory rate
2. Step two: assessment of the following anatomic criteria:
  - Penetrating injuries proximal to elbow and knee: head, neck, torso, extremities
  - Flail chest
  - Multiple proximal long-bone fractures
  - Crushed, degloved, or mangled extremity
  - Amputation proximal to wrist or ankle
  - Pelvic fractures
  - Open or depressed skull fracture
  - Paralysis
3. Step three: assessment of the following mechanism-of-injury criteria:
  - Falls (height)

- High-risk auto crash
  - Auto versus pedestrian/bicyclist thrown, run over, or with significant impact
  - Motorcycle crash >20 mph
4. Step four: assessment of special patient or system considerations:
- Age: adults >55 years, children <15 years
  - Anticoagulation and bleeding disorders
  - Burns
  - Time-sensitive extremity injury
  - End-stage renal disease requiring dialysis
  - Pregnancy >20 weeks
  - Emergency Medical Services (EMS) provider judgment

**Note:** Additional pediatric concerns were considered but no recommendations were made.

The following criteria were considered but removed from the revised decision scheme:

- Step One: Physiologic Criteria
  - Revised Trauma Score <11
- Step Three: Mechanism of Injury
  - Rollover crash
  - Extrication time >20 minutes
- Step Four: special considerations
  - Cardiac disease
  - Respiratory disease
  - Insulin-dependent diabetes mellitus
  - Cirrhosis
  - Morbid obesity
  - Immunosuppressed patients

## **MAJOR OUTCOMES CONSIDERED**

- Incidence of traumatic injuries
- Number of transport calls
- Accuracy of field triage (sensitivity, specificity, rates of over- and undertriage, positive predictive value, negative predictive value)
- Morbidity
- Disability rate
- Costs
- Mortality

## **METHODOLOGY**

### **METHODS USED TO COLLECT/SELECT EVIDENCE**

Hand-searches of Published Literature (Primary Sources)  
 Hand-searches of Published Literature (Secondary Sources)  
 Searches of Electronic Databases

### **DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE**

For the 2006 revision, a structured literature review was conducted by an epidemiologist to examine the four component steps of the Field Triage Decision Scheme. English-language articles published during 1966-2005 were searched in MEDLINE, using the medical subject headings "emergency medical services," "wounds and injury," and "triage." In addition, the reference sections of these articles were searched to identify other potential articles. Of 542 articles that were identified, 80 (15%) articles that specifically addressed field triage were subsequently reviewed. Panel members also identified additional relevant literature that had not been examined during the structured review. The Panel placed primary emphasis on articles published since the development of the 1999 version of the Decision Scheme.

## **NUMBER OF SOURCE DOCUMENTS**

Not stated

## **METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE**

Expert Consensus

## **RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE**

Not applicable

## **METHODS USED TO ANALYZE THE EVIDENCE**

Systematic Review

## **DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE**

In the sources reviewed, changes were considered statistically significant if the measure of alpha error (p-value) was  $<0.1$  or if the confidence interval (CI) for the odds ratio (OR) or relative risk (RR) was not inclusive of 1.0. Given the limitations of the evidence, no predetermined level of sensitivity or specificity ruled out a discussion of any evidence by the Panel. In general, injury severity score (ISS) of  $>15$  was used as the threshold for identifying severe injury; however, other factors (e.g., need for prompt operative care, intensive care unit [ICU] admission, and case-fatality rates) also were considered; in a few circumstances, the published evidence used different criteria or thresholds. A threshold of 20% positive predictive value (PPV) to predict severe injury (ISS of  $>15$ ), major surgery, or ICU admission was used to place new criteria into discussion for inclusion as mechanism-of-injury criteria. PPV of  $<10\%$  was used as a threshold for discussing whether to remove existing mechanism-of-injury criteria from the Decision Scheme. In selecting the PPV thresholds, the National Expert Panel of Field Triage recognized the limitations of data available in the relevant literature. Panel members also could nominate decision criteria having PPV 10%-20% for further discussion. Final consensus on the criteria in the Decision Scheme was reached on the basis of supporting or refuting evidence, professional experience, and the judgment of the Panel.

## **METHODS USED TO FORMULATE THE RECOMMENDATIONS**

Expert Consensus

### **DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS**

The National Expert Panel of Field Triage comprises 37 persons with expertise in acute injury care representing a range of interested groups, including emergency medical services (EMS) providers and medical directors, emergency medicine physicians and nurses, adult and pediatric trauma surgeons, the automotive industry, public health personnel, and representatives of federal agencies. Membership was determined on the basis of their national leadership, expertise, and contributions in the fields of injury prevention and control. The Panel is responsible for periodically reevaluating the Decision Scheme, determining if the decision criteria are consistent with current scientific evidence and compatible with advances in technology (e.g., vehicular telemetry), and, as appropriate, recommending revisions to the Decision Scheme. In May 2005, with support from National Highway Traffic Safety Administration's Office of Emergency Medical Services, the Centers for Disease Control and Prevention convened the Panel to evaluate and revise the 1999 Decision Scheme. The Panel recognized that peer-reviewed studies would be the preferred basis for deciding on revisions to the Decision Scheme but noted that scientific studies regarding the Decision Scheme and its component criteria were sparse. For this reason, the Panel decided to use multiple approaches to identify as many relevant published studies as possible and to consider other sources of evidence (e.g., consensus and policy statements from specialties and disciplines involved in injury prevention and control). Finally, when definitive research, consensus, or policy statements were lacking, the Panel based its revisions and recommendations on the expert opinion of its members.

The Panel met and reviewed the 1999 ACS Decision Scheme, and the proceedings from that meeting were published in 2006. Presentations and group discussions at the May 2005 meeting addressed 16 topics (see Box 3 in the original guideline document). The Panel determined that the limited evidence was most compelling in support of the physiologic (Step One) and anatomic (Step Two) criteria of the Decision Scheme. Agreement was unanimous that the mechanism-of-injury (Step Three) criteria needed revision, and approximately half of the Panel members recommended that the special considerations (Step Four) criteria, which address comorbidity and extremes of age, be revised. Ultimately, the Panel elected to undertake limited revisions of the physiologic and anatomic criteria and more substantive revision of the mechanism-of-injury and special considerations criteria.

Working subgroups of the Panel then conducted a further detailed review of the medical literature and developed recommendations regarding individual components of the Decision Scheme, focusing on the determination of the accuracy of existing criteria and on identifying new criteria needed for Steps Three and Four of the Decision Scheme. The recommendations of the working subgroups were presented to the entire Panel in April 2006 for discussion, minor modification, and formal adoption.

### **RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS**

Not applicable

## **COST ANALYSIS**

### **Economic Benefits of Accurate Field Triage**

Since 1993, crowding in emergency departments (EDs) has increased greatly as a result of reductions in the number of hospitals with EDs, regionalization of surgical care, increases in nonemergency patient visits to EDs, diversion of emergency medical services (EMS), and personnel shortages. Increasing use of EDs by uninsured patients, inadequate reimbursement from payers, rising insurance costs, and physician-related issues (e.g., on-call coverage and physician commitment) all present economic challenges. For example, in 2001, five public trauma centers in Texas had a mean operating loss of \$18.6 million. The initial cost to establish a trauma center (e.g., verification process, staffing, on-call coverage, outreach, and prevention) is substantial, and the median annual fixed cost for trauma-center readiness has been estimated at \$2.7 million.

The cost of injury in the United States also is substantial, exceeding \$400 billion in 2000, the most recent year for which data were available. The approximately 50 million persons whose injuries required medical treatment in 2000 were associated with an estimated \$80 billion in medical costs and an estimated \$326 billion in productivity losses (see Table 3 in the original guideline document). Injured persons treated in EDs in 2000 accounted for \$99 billion (24%) of the total cost of injury, with \$32 billion in medical costs and \$68 billion in productivity losses. During 1993 to 2003, the total number of annual ED visits for all causes increased 26%, from 90.3 million in 1993 to 113.9 million in 2003. In 2003, approximately 29.2 million (26%) ED visits were for nonfatal injuries. By 2004, the number of ED visits for nonfatal injuries exceeded 41 million, and more than 6.5 million injured patients (16%) were transported by ambulance.

The Decision Scheme is predicated on the assumption that making appropriate destination decisions will reduce both overtriage and undertriage. Accurate field triage is one part of a complex solution for lowering injury costs. The cost of treatment in a trauma center is almost twice that of treatment in a nontrauma center. Overtriage results in an overutilization of financial and human resources, can contribute to trauma-center overcrowding, and increases EMS transport times and hospital turnaround times.

## **METHOD OF GUIDELINE VALIDATION**

External Peer Review  
Internal Peer Review

## **DESCRIPTION OF METHOD OF GUIDELINE VALIDATION**

The revised Decision Scheme was distributed together with a draft description of the revision process to relevant associations, organizations, and agencies representing acute-injury care providers and public health professionals for their review and endorsement.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

**Note on changes in the updated guideline:** The 2006 version of the Decision Scheme reflects multiple changes from the version published in 1999. Certain changes represent additions to the scheme, and others are modifications of the 1999 criteria; in addition, certain criteria have been removed altogether. The changes are summarized in the table below.

**Table: Changes in Field Triage Decision Scheme Criteria from 1999 Version – United States, 2006**

#### Step One: Physiologic Criteria

- Add a lower limit threshold for respiratory rate in infants (aged <1 year) of <20 breaths per minute
- Remove Revised Trauma Score <11

#### Step Two: Anatomic Criteria

- Add crushed, degloved, or mangled extremity
- Change "open and depressed skull fractures" to "open or depressed skull fractures"
- Move combination trauma with burns and major burns to Step Four

#### Step Three: Mechanism-of-Injury Criteria

- Add vehicular telemetry data consistent with high risk of injury
- Clarify criteria for falls to include:
  - Adults: fall >20 ft (two stories)
  - Children aged <15 years: fall >10 ft or two to three times the child's height
- Change "high-speed auto crash" to "high-risk auto crash" and modify to include any of the following:
  - Intrusion >12 inches at occupant sit
  - Intrusion >18 inches at any site
  - Partial or complete ejection from the vehicle
  - Death of another passenger in the same passenger compartment
  - Vehicle telemetry data consistent with high risk for injury
- Revise "auto-pedestrian/auto-bicycle injury with significant (>5 mph) impact" and "pedestrian thrown or run over" to "Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact"
- Revise "motorcycle crash >20 mph with separation of rider from bike" to "motorcycle crash >20 mph"
- Remove "initial speed >40 mph, major auto deformity >20 inches, extrication time >20 min, and rollover"

#### Step Four: Special Considerations

- Add "time-sensitive extremity injury, end-stage renal disease requiring dialysis, and Emergency Medical Service provider judgment"
- Add burns from Step Two
  - Burns without other trauma mechanism: triage to burn facility
  - Burns with trauma mechanism: triage to trauma center
- Clarify aged <5 years or >55 years to read:
  - Older adults: risk of injury death increases after age 55 years
  - Children: should be triaged preferentially to pediatric-capable trauma centers
- Change "patient with bleeding disorder or patient on anticoagulants" to "anticoagulation and bleeding disorders"
- Change "pregnancy" to "pregnancy >20 wks"
- Remove "cardiac disease, respiratory disease, insulin-dependent diabetes, cirrhosis, morbid obesity, and immunosuppressed patients"

**Note on trauma center levels:** Trauma centers are classified into levels by the American College of Surgeons Committee on Trauma (ACS-COT) depending on the scope of resources and services available, ranging from Level I, which provides the highest level of care, to Level IV, which provides initial trauma care and transfer to a higher level of trauma care if necessary. See the table below for definitions of these levels.

**Table: Levels of Trauma Centers (TCs)**

#### **Level I**

- Regional resource hospital that is central to trauma care system
- Provides total care for every aspect of injury, from prevention through rehabilitation
- Maintains resources and personnel for patient care, education, and research (usually in university-based teaching hospital)
- Provides leadership in education, research, and system planning to all hospitals caring for injured patients in the region

#### **Level II**

- Provides comprehensive trauma care, regardless of the severity of injury
- Might be most prevalent facility in a community and manage majority of trauma patients or supplement the activity of a Level I TC
- Can be an academic institution or a public or private community facility located in an urban, suburban, or rural area
- Where no Level I TC exists, is responsible for education and system leadership

#### **Level III**

- Provides prompt assessment, resuscitation, emergency surgery, and stabilization and arrange transfer to a higher-level facility when necessary



- Maintains continuous general surgery coverage
- Has transfer agreements and standardized treatment protocols to plan for care of injured patients
- Might not be required in urban or suburban area with adequate Level I or II TCs

#### **Level IV**

- Rural facility that supplements care within the larger trauma system
- Provides initial evaluation and assessment of injured patients
- Must have 24-hour emergency coverage by a physician
- Has transfer agreements and a good working relationship with the nearest Level I, II, or III TC

**Source:** Adapted from the American College of Surgeons. Resources for the optimal care of the injured patient. Chicago, IL: American College of Surgeons; 2006.

### **Field Triage Decision Scheme Recommendations**

#### **Step One: Physiologic Criteria**

Step One of the Decision Scheme seeks to guide emergency medical services (EMS) personnel in identifying critically injured patients rapidly through measuring their vital signs and assessing their level of consciousness. The instruction "measure vital signs and level of consciousness" has been included since the 1986 version of the American College of Surgeons (ACS) Field Triage Decision Protocol.

The Panel recommended transport to a trauma center if any of the following are identified:

- Glasgow Coma Scale (GCS) of <14
- Systolic blood pressure (SBP) of <90 mmHg
- Respiratory rate of <10 or >29 breaths per minute (<20 in infant aged <1 year)

#### *Glasgow Coma Scale <14: Criterion Retained*

After reviewing and discussing the available evidence, the Panel determined that the GCS criterion should be retained in the 2006 Decision Scheme. The Panel's decision was made primarily on the basis of its conclusion that the totality of existing studies indicated that GCS is a reasonably predictive criterion for severe injury (injury severity score [ISS] of >15, risk of death, need for immediate surgical intervention, or other indicators). The Panel also observed that no studies have refuted the usefulness of GCS as a triage criterion, and no other measure of coma has been demonstrated to be more effective. The Panel also considered three additional factors. First, GCS has been a Decision Scheme triage criterion since 1986, and field providers have become familiar with its use. Second, GCS scores can be calculated quickly and easily in the field and communicated easily to receiving hospitals as an effective summary measure of closed-head injury while the patient is being transported, which can assist in the activation of needed additional emergency department (ED) personnel and resources before the

patient's arrival. Finally, GCS plays an important role in triage and trauma outcomes research and for that reason should continue to be used for field triage.

*Systolic Blood Pressure <90 mmHg and Respiratory Rate <10 or >29 Breaths Per Minute: Criterion Retained*

Although published evidence is lacking, in accordance with the precept that acceptance of a higher rate of overtriage is justified among pediatric patients because of the need to avoid poor outcomes sometimes associated with undertriage in this vulnerable population, the Panel decided to retain the field triage criterion for SBP (<90 mmHg) for children. Because the mean SBP in children is lower than in adults, the retained criterion is thought to be highly sensitive for severe injury in children. Also, although the generally accepted estimate for age-specific hypotension for infants is <70 mmHg, the Panel concluded that transporting an infant with SBP of <90 mmHg to a trauma center (preferably a pediatric trauma center) carried an acceptable risk of overtriage. The Panel also recognized that obtaining accurate blood pressure readings in an infant or small child in the field or during transport often is difficult.

*Respiratory Rate of <20 Breaths Per Minute in Infants Aged <1 year: Criterion Added*

A respiratory rate of <10 breaths per minute predicts with reasonable sensitivity those adults and children at risk for serious injury and needing a high level of trauma care. However, the lower limit for a normal respiratory rate for infants aged <1 year is approximately 20 breaths per minute. Although assessing physiologic parameters in infants in the field is difficult, respiratory rate is the one vital sign that can be measured easily. Measurement of respiratory rate is a particularly practical triage criterion, even in infants, because it is easily observed and because EMS providers are taught the importance of respiratory rate assessment in infants.

The 1999 Decision Scheme included one simple triage criterion for respiratory rate, a rate <10 or >29, for persons of all ages. Although no studies have evaluated respiratory rate specifically as a triage criterion for infants aged <1 year, the Panel concluded that a triage criterion using a respiratory rate of <20 breaths per minute in infants more appropriately reflects the risk for severe injury requiring higher level care. The Panel determined that a criterion for infants of <10 breaths per minute, although appropriate for older children and adults, is too low to serve as a triage criterion for infants.

In adding this triage criterion, the Panel also noted that respiratory rates that are too fast or too slow can indicate respiratory failure as a sequel to trauma. Further, knowing the respiratory rate improves identification of respiratory depression or shock in infants aged <1 year. The Panel left unchanged in the 1999 Scheme the respiratory rate criterion for infants aged  $\geq 1$  year (>29 breaths per minute).

*Other Physiologic Observations*

Abnormal pulse rate and skin findings never have been included in the Decision Scheme and are not included in the revised version. However, as a matter of good

practice, abnormal pulse or skin condition should prompt EMS providers to seek other physiologic indications of severe injury.

#### *Transition from Step One to Step Two*

Patients meeting the physiologic criteria of Step One have potentially serious injuries and should be transported to the highest level trauma center (i.e., Level I, if available).

For patients who do not meet Step One criteria, the EMS provider should proceed to Step Two of the Decision Scheme.

#### **Step Two: Anatomic Criteria**

Step Two of the Decision Scheme recognizes that certain patients, on initial presentation to EMS providers, might have a severe injury and need care at a high-level trauma center but have physiologic parameters that do not meet the criteria of Step One. In these cases, reliance on physiologic criteria alone might lead to undertriage.

The Panel recommended transport to a trauma center if any of the following are identified:

- All penetrating injuries to head, neck, torso, and extremities proximal to elbow and knee
- Flail chest
- Two or more proximal long-bone fractures
- Crushed, degloved, or mangled extremity
- Amputation proximal to wrist and ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis

#### *All Penetrating Injuries to Head, Neck, Torso, and Extremities Proximal to Elbow and Knee: Criterion Retained*

Of all penetrating injuries to head, neck, torso, and extremities proximal to elbow and knee, the most compelling as a triage criterion is penetrating torso injuries because these might require an emergency thoracotomy, a procedure not available at all hospitals. For this reason, the Panel focused much of its discussion on penetrating torso injuries. Noteworthy survival rates have been documented in clinically dead (pulseless/apneic) or critically ill and dying patients with penetrating torso trauma who were transported to facilities with immediate surgical capabilities.

On the basis of available evidence, the Panel decided to retain penetrating torso injuries as a triage criterion. In addition to torso injuries, the Panel determined that penetrating injuries to the head, neck, or proximal extremities also represent a high risk to the patient and concluded that this criterion should be retained in the revised 2006 Decision Scheme. The Panel concluded that the potential is high for severe injury and adverse outcomes, including mortality, from such

penetrating injuries, which most often are caused by firearms and knives. Surface examination of the wound in the field frequently does not allow adequate analysis of the extent of underlying injury. Penetrating injuries to the head, neck, torso, and proximal extremities place vital systems (including the cardiopulmonary, vascular, and neurologic systems) at risk and often are associated with severe injury. Vascular damage in these anatomic regions might result in life-threatening exsanguinating hemorrhage, and nerve damage might result in permanent disability. Damage to bones and complicated infections often are associated with penetrating trauma. Rapid intervention might be needed to prevent morbidity and mortality due to these injuries. Because the management of these injuries might require skills and resources not available at every hospital, triage of patients who meet these criteria to the highest level trauma center improves the likelihood of prompt access to trauma surgeons, cardiothoracic surgeons, neurosurgeons, vascular surgeons, and orthopedic surgeons and to properly equipped ICUs and operating theaters. In addition, these injuries might require early and careful coordination between acute care and rehabilitation medicine, a process that might be available more readily at higher level trauma centers.

*Flail Chest, Two or More Proximal Long-Bone Fractures, Paralysis, Pelvic Fractures, and Amputation Proximal to the Wrist and Ankle: Criterion Retained*

Limited evidence specifically addresses the field triage of patients with flail chest, two or more proximal long-bone fractures, paralysis, pelvic fractures, and amputation proximal to the wrist and ankle.

In reviewing this criterion, the Panel took into consideration reported high case-fatality rates, which place at risk vital systems, including the cardiopulmonary, musculoskeletal, vascular, and neurologic systems, and have the potential to require specialized surgical and intensive care. Rapid intervention might be needed to prevent morbidity and mortality. Because the management of these injuries might require skills and resources not available at every hospital, triage of patients meeting these criteria to the highest level trauma center improves the likelihood of prompt access to trauma surgeons, cardiothoracic surgeons, neurosurgeons, vascular surgeons, and orthopedic surgeons and to properly equipped ICUs and operating theaters. In addition, these injuries might require early and careful coordination between acute care and rehabilitation medicine, a process that might be more readily available at higher level trauma centers. After considering all these factors, the Panel elected to retain this criterion in the 2006 Decision Scheme.

*Crushed, Degloved, or Mangled Extremity: Criterion Added*

Although Step Two of the 1999 Decision Scheme addressed extremity injuries, the Panel was concerned that the Scheme did not explicitly identify the crushed, degloved, or mangled extremity, a severe injury that results in extensive tissue damage. No evidence was identified in the literature on which to base a triage recommendation for such injuries. However, on the basis of expert opinion, the Panel reached a consensus that the sensitivity for triage of these injuries to trauma centers should be as raised. Therefore, the Panel elected to add to the Decision Scheme the criterion "crushed, degloved, or mangled extremity" (these terms are consistent with educational material targeted at EMS providers).

In reaching its conclusion, the Panel took several factors into account. Injuries that crush, deglove, or mangle extremities are complex and might threaten loss of the limb or of the patient's life. Such injuries potentially involve damage to vascular, nerve, bone, or soft tissue, singly or, more often, in combination. Neurovascular injury is assumed in all injured extremities until definitively excluded. Treatment of vascular injury within 6 hours is the major determinant of limb salvage. Further, the risk for ischemia, wound infection, delayed union or nonunion of fractures, and chronic pain associated with these injuries is high. Therefore, these injuries frequently require a rapid and coordinated multidisciplinary approach that might include emergency medicine, trauma surgery, radiology, vascular surgery, orthopedic surgery, treatment of infectious disease, and availability of operating theaters and management in an intensive care unit (ICU). The Panel determined that transporting patients with such injuries to a facility that offers the highest level of care available within the trauma system provides the best chance for appropriate and rapid assessment and treatment.

#### *Open or Depressed Skull Fracture: Criterion Modified*

Because no published literature addresses the triage of patients with skull fractures in general or the triage of patients with open or depressed skull fractures specifically, the Panel relied on its expert opinion regarding this criterion. During its discussions, the Panel noted that either an open or a depressed skull fracture might signify severe injuries requiring high operating theater or ICU use. Therefore, the Panel modified the wording of this criterion from "open and depressed" to "open or depressed," recognizing that these types of skull fractures can occur separately but that each can represent a severe head injury. The Panel decided to retain this modified criterion and in doing so confirmed that patients with either open or depressed skull fractures should be transported to the highest level of trauma center available. In its deliberations, the Panel noted that skull fractures, whether open or depressed, result from considerable force to the skull and the seriousness of the injury should not be underestimated. Initial field evaluation of the patient might not reveal the extent of underlying neurologic injury, any suspected or confirmed skull fracture might be life-threatening, and all such injuries should receive immediate intervention. Neuroimaging of confirmed or suspected skull fracture always is required, and not all hospitals have this capability and the ability to offer immediate specialized neurosurgical care. In addition, prompt diagnosis and treatment of open or depressed skull fractures commonly requires a rapid multidisciplinary approach involving emergency medicine, trauma surgery, radiology, and neurosurgery, specialized services typically only available at higher level trauma centers.

#### *Major Burns: Criterion Moved From Step Two to Step Four*

Burn injury was moved from Step Two to Step Four in the Decision Scheme to emphasize the need to determine whether the burn occurred with other injuries. Patients sustaining isolated burns in which the burn injury poses the greatest risk for morbidity and mortality are cared for optimally at a specialized burn center. Patients sustaining burns associated with other trauma, in which that other trauma poses the greater risk to the patient, need evaluation at a trauma center. The Panel recognized that providing care for patients with both burn and nonburn injuries depends on available local resources, individual physician clinical

judgment, and local and regional transfer protocols. Triage for burn injury is discussed further in Step Four.

#### *Transition from Step Two to Step Three*

Patients meeting criteria in Step Two of the Scheme should be transported to the highest level trauma center available in the system, typically Level I or II. For patients who do not meet Step Two criteria, the EMS provider should proceed to Step Three of the Decision Scheme.

### **Step Three: Mechanism-of-Injury Criteria**

A patient who does not meet Step One or Step Two criteria might still have severe, but occult, injury. In field triage, the mechanism of injury should be evaluated next to determine whether the injured person should be transported to a trauma center.

The Panel recommended transport to a trauma center if any of the following are identified:

- Falls
  - Adults: fall >20 feet (one story = 10 feet)
  - Children aged <15 years: fall >10 feet or two to three times child's height
- High-risk auto crash
  - Intrusion: >12 inches to the occupant site or >18 inches to any site
  - Ejection (partial or complete) from automobile
  - Death in same passenger compartment
  - Vehicle telemetry data consistent with high risk of injury
- Auto versus pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact
- Motorcycle crash >20 mph

#### *Falls --- Adults Who Fall >20 Feet: Criterion Retained*

The extent of injury from a fall depends on characteristics of the person, the distance fallen, the landing surface, and the position at impact.

In reaching its conclusion, the Panel noted that the fall height criterion for adults of >20 feet has been a component of the Decision Scheme since 1986 and is familiar to prehospital providers and their medical directors. In addition, the Panel took note of the established relationship between increase in fall height and increased risk for head injury, death, ICU admission, and the need for operating room care. The Panel concluded that in the absence of new evidence that establishes a definitive height for this criterion or that supports changing or eliminating the criterion for falls of >20 feet for adults (with 10 feet equivalent to one story of a building), this criterion should be retained, and adult patients who fall >20 feet should be transported to the closest appropriate trauma center for evaluation.

*Falls --- Children Who Fall >10 Feet or Two to Three Times the Height of the Child: Criterion Added*

A new criterion for children aged <15 years who fall >10 feet or two to three times their height was added to the 2006 Decision Scheme. Evidence examining the field triage of children who have sustained injuries from falls is limited, but the existing literature indicates that children are more likely than adults to sustain injuries from falls of comparable heights.

Although affected by individual circumstances, the threshold for traumatic brain injury appears to be reached for falls from a height of approximately six to 10 feet. However, occasional deaths have been reported resulting from unintentional falls from lesser heights.

Reported fall heights for children might be inaccurate or misleading. Data illustrate that if evidence at the scene other than fall height suggests potential serious injury (e.g., suspicious parental behavior, with a child reported to have fallen from a bed), EMS providers should consider transporting the patient to a trauma center.

Because of suggestions in the scientific literature that children might sustain greater injuries after falls from lower heights than adults, the difficulty in estimating heights of falls, and the potential for mechanisms of injury that are not apparent at the scene, the Panel elected to set the fall criterion at >10 feet or two to three times the height of the child, to increase the sensitivity for identifying children with severe injuries.

*High-Risk Auto Crash --- Intrusion of >12 Inches at Occupant Site or >18 Inches at Any Site: Criterion Modified*

In the 1999 Decision Scheme, two criteria were related to vehicle deformity or crush: "major auto deformity >20 inches" and "intrusion into passenger compartment >12 inches." In the revised 2006 Decision Scheme, the criteria for vehicle crash with cabin intrusion has been simplified slightly to an intrusion of >12 inches for occupant site (i.e., the passenger cabin or any site within the vehicle in which any occupant was present at the time of the crash) or >18 inches for any site in the vehicle. Intrusion refers to interior compartment intrusion, as opposed to exterior deformation of the vehicle. The 2006 Decision Scheme also has been changed with regard to the action indicated if intrusion criteria are met. Under the 1999 Scheme, both criteria prompted EMS personnel to "contact medical direction and consider transport to a trauma center" and to "consider trauma team alert." Under the 2006 Decision Scheme, if this criterion is met, the affected patients should be transported to the closest appropriate trauma center, which, depending on the trauma system, need not be the highest level trauma center.

The Panel also recognized that recent changes in vehicle design and construction probably have reduced the effect of crush on the risk for severe injury in crashes. Whereas older vehicles were more likely to transmit the kinetic energy of crashes to vehicle occupants and cause severe injuries, newer vehicles are designed to crush externally and absorb energy, protecting passenger compartment integrity and occupants. Additionally, the Panel took note of the difficulty of using

deformity or crush criteria in the field. Crash sites are difficult environments in which to estimate such measures, and little might be left of a vehicle to serve as a reference point for determining crush depth.

Despite this evidence, the Panel determined that removing all criteria for vehicle deformity or crush from the 2006 Decision Scheme would not be appropriate for four reasons. First, although available research did not support the use of such criteria to predict severe injuries, the existing studies were few and limited, and additional research would be needed to determine definitively that vehicle deformity or crush was not predictive of severe injuries. Second, extensive anecdotal experience in trauma practice indicates that increasing cabin intrusion is indicative of an increasing amount of force on the vehicle and potentially on the occupant. Third, side-impact intrusions could present special clinical concerns that had not been recognized fully in existing research, considering the limited space between the impact and occupant. Finally, although modern vehicles have better energy-absorbing capability, vehicle incompatibility (crash involving both a large and a small vehicle) might be increasingly important in the level of vehicle intrusion in crashes, a factor perhaps not fully captured by available research, which could potentially increase the predictive value of the magnitude of vehicle deformity or crush.

*High-Risk Auto Crash --- Ejection (Partial or Complete) from Automobile: Criterion Retained*

Ejection from a motor vehicle as a result of a crash is associated with increased severity of injury.

In its discussions of the ejection criteria, the Panel noted that a person who has been ejected from a vehicle as a result of a crash has been exposed to a substantial transfer of energy with the potential to result in severe life- or limb-threatening injuries. Lacking the protective effects of vehicle-restraint systems, occupants who have been ejected might have struck the interior multiple times before ejection. Further, ejection of the patient from the vehicle increases the chance of death by 25 times, and one of three ejected victims sustains a cervical spine fracture. The Panel concluded that the literature review identified no studies that argued persuasively for removal of this criterion. Therefore, on the basis of the available, albeit limited, evidence, combined with the Panel's experience, ejection from the vehicle was retained as a criterion.

Because the literature reviewed indicated that partial or complete ejection is associated with severe injury, ICU admission, urgent surgery, or death, the Panel further concluded that even if these patients do not meet physiologic or anatomic criteria, they still warrant a trauma-center evaluation on the basis of mechanism only. Additionally, ejections of vehicle occupants are not frequent, and transporting all such patients for evaluation would not be expected to overburden the system. These patients should be transported to the closest appropriate trauma center, which, depending on the trauma system, need not be the highest level trauma center.

*High-Risk Auto Crash --- Death in Same Passenger Compartment: Criterion Retained*



The death of an occupant in a vehicle is indicative of a substantial force applied to a vehicle and all its occupants.

After reviewing the evidence, the Panel concluded that death in the same passenger compartment should be retained as a criterion for the 2006 Decision Scheme. Surviving passengers should be transported to the closest appropriate trauma center.

*High-Risk Auto Crash --- Vehicle Telemetry Data Consistent with High Risk of Injury: Criterion Added*

In earlier versions of the Decision Scheme, high vehicle speed, vehicle deformity of >20 inches, and intrusion of >12 inches for unbelted occupants were included as mechanism-of-injury criteria. National Automotive Sampling System (NASS) data indicate that risk for injury, impact direction, and increasing crash severity are linked. Previously, the usefulness of vehicle speed as a criterion had been limited because of the difficulty in estimating impact speed accurately. However, new Advanced Automatic Collision Notification (AACN) technology installed in certain automobiles, now in approximately five million vehicles in the United States and Canada, can identify vehicle location, measure change in velocity (delta V) during a crash, and detect crash principal direction of force, airbag deployment, rollover, and the occurrence of multiple collisions. Recognizing that AACN systems will become more available, the Panel added vehicle telemetry data consistent with a high risk for injury (e.g., change in velocity and principal direction of force) as a triage criterion. The Panel did not designate which specific components of telemetry should be used as triage criteria, as additional evaluation of available data is needed to define the exact components (e.g., speed and delta V) consistent with a high risk for injury. The Centers for Disease Control and Prevention is working with the automotive industry and experts in public health, public safety, and health care to examine how AACN data can be used to predict injury severity, conveyed to EMS services and trauma centers, and integrated into the field triage process.

*Auto Versus Pedestrian/Bicycle Thrown, Run Over, or with Significant (>20 mph) Impact: Criterion Retained*

Pedestrians and cyclists who are run over or struck by a vehicle are at risk for major injuries.

On the basis of their clinical experience, members of the Panel reported a high incidence of ICU admission and operating room management for pedestrians struck by a vehicle and for bicyclists thrown, run over, or struck with substantial impact. On the basis of the Panel's experience and the evidence reviewed, the criterion was retained in the 2006 Decision Scheme to ensure that pedestrians or cyclists who are victims of such vehicular injuries are transported to a trauma center.

*Motorcycle Crash >20 mph: Criterion Retained*

Motorcycle crashes can subject a rider's body directly to substantial force and energy. In a crash, the motorcycle itself does not provide the rider with any external protection (as does the frame of an automobile or a truck); any

protection comes from whatever gear the rider might wear (e.g., helmet, leather, and boots). However, wearing helmets is not required uniformly in the United States, and motorcyclists do not always wear them even when legally required to do so. Motorcycles also lack the protective restraint systems provided in automobiles and trucks. Thus, a motorcycle crash, by its very nature, places the rider at an increased risk for injury compared with occupants of automobiles or trucks in a similar or the same crash event.

The Panel's clinical experience indicated that such injuries (which can be to the head, torso, and extremities) might be severe, requiring the assessment and treatment resources afforded by trauma centers. Although the evidence on the field triage of motorcycle-crash patients was limited, the Panel also noted that data were insufficient to justify the removal of motorcycle crash as a triage criterion. Recognizing the need for further research evaluating this criterion, the Panel elected to retain motorcycle crash at >20 mph as a criterion for transport to a trauma center.

#### *Transition from Step Three to Step Four*

The answer of "yes" at Step Three of the Decision Scheme mandates transport of the patient to the closest appropriate trauma center, not necessarily to a center offering the highest level of trauma care available, as is the case in Steps One and Two. Which center is the most appropriate at any given time will depend on multiple factors, including the level of trauma center readily available, the configuration of the local or regional trauma system, local EMS protocols, EMS system capacity and capability, transport distances and times, and hospital capability and capacity. Patients whose injuries meet mechanism-of-injury criteria but not physiologic or anatomic criteria do not necessarily require the highest level of care available. At the time of evaluation, these patients are hemodynamically stable, have a GCS of  $\geq 14$ , and have no anatomic evidence of severe injury. Their risk lies only in the mechanism by which they were injured. Thus, they require evaluation but do not need immediate transport by EMS providers to a Level I or Level II facility. If a severe injury is identified at the initial hospital evaluation, these patients may be transferred subsequently to a higher level of trauma care. For patients who do not meet Step Three criteria, the EMS provider should proceed to Step Four of the Scheme.

#### **Step Four: Special Considerations**

In Step Four, EMS personnel must determine whether persons who have not met physiologic, anatomic, or mechanism-of-injury criteria have underlying conditions or comorbid factors that place them at higher risk for severe injury. Persons with such underlying conditions might require trauma-center care.

Step Four of the Decision Scheme focuses on identifying patients who are at risk for severe injury and thus require a high level of trauma care because of a comorbid condition despite appearing to have no substantial injury after evaluation using the physiologic, anatomic, and mechanism-of-injury criteria. The Panel recommended that transport to a trauma center or specific resource hospital be considered if any of the following are identified:

- Age

- Adults aged >55 years
- Children aged <15 years
- Anticoagulation and bleeding disorders
- Burns
  - Without other trauma mechanism: triage to burn facility
  - With trauma mechanism: triage to trauma center
- Time-sensitive extremity injury
- End-stage renal disease requiring dialysis
- Pregnancy >20 weeks
- EMS provider judgment

#### *Age -- Older Adults: Criterion Retained*

Adult trauma victims aged >55 years are at increased risk for injury and death.

Age also places trauma victims at increased risk for other comorbidities associated with more severe injury and poor outcomes.

The Panel concluded that advanced patient age should lower the threshold for field triage directly to a trauma center. The 2006 Decision Scheme is designed to be consistent with that finding.

#### *Age -- Children: Criterion Retained*

Children aged <15 years who meet the criteria of Steps One through Three should be transported to a pediatric trauma center if one is available. The age that separates children from adults for purposes of field triage is difficult to define with certainty. ACS Committee on Trauma defines pediatric patients as those aged <15 years, and the Panel adopted this threshold.

#### Additional Pediatric Concerns Reviewed by the Panel

Abdominal injuries and restraint use in children warrant further mention. An analysis that used an insurance company electronic claims database to determine the association between restraint use, abdominal bruising, and intra-abdominal injury has led certain experts to suggest that abdominal bruising should be given special consideration in the field triage of injured children. However, the Panel decided against including this finding as a special consideration.

No published data suggest that injured children, in the absence of physiologic, anatomic, or mechanism-of-injury triage criteria, are at risk for negative outcomes solely on the basis of their age. The criteria in Steps One, Two, and Three of the 2006 Decision Scheme are expected to identify nearly all seriously injured children. Therefore, the Panel identified no specific age below which all injured children should be transported to a trauma center.

However, children meeting the revised field triage criteria for transport to trauma centers in Steps One through Three of the Decision Scheme should be transported preferentially to pediatric-capable trauma centers.

#### *Anticoagulation and Bleeding Disorders: Criterion Retained*

Patients with coagulopathy or those undergoing treatment with anticoagulants (e.g., warfarin or aspirin) are at increased risk for intracranial hemorrhage, increased severity of hemorrhage, and associated morbidity and mortality.

The Panel noted that in the head-injured anticoagulated patient, the severity and rapidity with which intracranial hemorrhage might occur increases the likelihood of long-term disability or death. Prompt provision of neurosurgical services might be required for these patients. The Panel further agreed that any patient who is on anticoagulants or has a bleeding disorder and has an injury that does not meet Step One, Two, or Three criteria might need treatment at a facility that can do a prompt imaging and administer products rapidly to reverse anticoagulation. In conclusion, given the increased risk for morbidity and mortality and potential resource needs of these patients, the Panel recommended that EMS contact medical control and consider transport to a trauma center or a hospital with resources that will meet the potential needs. For this reason, this criterion was retained in the 2006 Decision Scheme.

#### *Burns --- With or Without Other Trauma: Criterion Modified*

Burns as a criterion was moved from Step Two (anatomic criteria) to Step Four (special considerations) of the Decision Scheme to emphasize the need to determine if the burn occurred with or without other injuries. In the absence of other trauma, burn patients should be transported to a burn center rather than a trauma center. Because burn patients who have concomitant trauma have greater risk for morbidity and mortality, ACS and the American Burn Association recommend transfer to a burn center. If the nonburn injury presents a greater immediate risk, the patient should be stabilized in a trauma center and then transferred to a burn center. The Panel accepted this recommendation and included burns as a special circumstance warranting consideration of trauma-center care.

#### *Time-Sensitive Extremity Injury: Criterion Added*

Time-sensitive extremity injury (e.g., open fracture or fracture with neurovascular compromise) was not part of Decision Schemes before 2006. Although the Panel did not identify any studies that specifically evaluated the field triage of such injuries, the members did discuss that fact that patients with time-sensitive extremity injuries are at risk for both infection and musculoskeletal and neurovascular deterioration of the limb and that rapid intervention might be needed to preserve the neurovascular status of the extremity and prevent loss of limb function or amputation. Further, the Panel noted that the resources required to evaluate whether additional intervention is required to preserve the limb are not readily available at all hospitals. Even when patients with such injuries do not meet anatomic criteria, they are nonetheless at substantial risk for morbidity. Field providers, in communication with their medical directors, should consider transport to a trauma center or specific resource hospital with the capability to manage these injuries. To ensure that such transport is considered, the Panel added this criterion to the 2006 Decision Scheme.

#### *End-Stage Renal Disease Requiring Dialysis: Criterion Added*

Although no studies were identified that evaluated the field triage of renal disease or dialysis patients, the Panel noted that because end-stage renal disease patients requiring dialysis often are coagulopathic, these patients might be at increased risk for hemorrhage and severity of hemorrhage, with the potential for increased morbidity and mortality. Patients requiring dialysis treatment and evaluation and treatment of injuries not identified in Steps One, Two, and Three thus need the resources available at a trauma center or specific resource hospital capable of managing both the end-stage renal disease and the injuries. The Panel recommended that EMS personnel contact medical control to consider these patients for transport to such facilities and added this criterion to the 2006 Decision Scheme.

#### *Pregnancy >20 Weeks: Criterion Modified*

Pregnancy was included in Step Four of the 1999 Decision Scheme. The Panel reviewed evidence indicating that the primary risk associated with injury to a pregnant woman is to the fetus, not to the mother, and therefore decided to modify the criterion on the basis of gestational age.

In its deliberations, the Panel considered multiple factors. Injury to a pregnant woman places both the mother and the fetus at risk, with the primary risk to the fetus. For EMS providers, the primary focus of care continues to be the resuscitation of the mother, which is essential both to mother and fetus. However, anatomic and physiologic changes associated with pregnancy make assessment and treatment more complex. Evidence suggests that fetal demise is a greater risk in a severely injured mother. Although patients with severe injuries might be identified in the first three steps of the Decision Scheme, the lack of specific evidence addressing pregnancy convinced the Panel to retain this criterion, but with a modification. Pregnant patients whose fetal gestational age is estimated to be >20 weeks, whose injuries do not meet Step One, Two, or Three criteria, might nonetheless require care at a trauma center or specialized obstetrical care not available at all trauma centers or hospitals. The Panel therefore determined that the phrasing "pregnancy >20 weeks" captures more accurately the association of fetal gestational age and potential viability in this context and made this change for the 2006 Decision Scheme. The Panel recommends that transport to a trauma center or to a hospital with obstetrical resources should be considered for injured women who are >20 weeks pregnant and that the transport destination decision should be made during the contact of EMS providers with medical control for these patients.

#### *EMS Provider Judgment: Criterion Added*

The Panel recognized the impossibility of predicting all possible special circumstances that might exist at an injury scene. EMS providers make triage decisions on a routine basis and have the expertise and experience needed to make judgments regarding atypical situations. Depending on the situation, capabilities of the EMS and trauma systems, and local policies, EMS providers may decide independently or in association with online medical direction to transport a patient not otherwise meeting the criteria in Steps One through Four to a trauma center.

#### *Additional Considerations*

Step Four emphasizes the need to transport patients with special circumstances or needs to the most appropriate hospital. Although decisions might be dictated by standing protocols, for patients meeting the criteria in Step Four, online medical direction should be consulted to determine the most appropriate facility to treat patients requiring special consideration. If patients do not meet criteria for triage to a trauma center in Steps One through Four of the Decision Scheme, EMS providers should use local protocols for transport without the need to contact medical control.

### *When in Doubt*

EMS providers are involved with triage decisions on a routine basis. They have the field experience needed to make specific judgments regarding care in their individual locales. Accordingly, any gaps in these criteria should not be construed as prohibiting transport of any patient to a trauma center. Injury is complex and often does not lend itself to stepwise, dichotomous checklists. The last line of the 2006 Decision Scheme, essentially unchanged from previous versions, is "When in doubt, transport to a trauma center" (see Figure 1 in the original guideline document).

**Note:** The following criteria were deleted:

- Step One: Physiologic Criteria
  - Revised Trauma Score <11
- Step Three: Mechanism of Injury
  - Rollover Crash
  - Extrication Time >20 Minutes
- Step Four: Special Considerations
  - Cardiac Disease and Respiratory Disease
  - Insulin-Dependent Diabetes Mellitus
  - Cirrhosis
  - Morbid Obesity
  - Immunosuppressed Patients

## **CLINICAL ALGORITHM(S)**

The following algorithms are provided in the original guideline document:

- Field triage decision scheme – United States, 1999
- Field triage decision scheme – United States, 2006

## **EVIDENCE SUPPORTING THE RECOMMENDATIONS**

### **TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS**

The recommendations are based on analysis of the current literature and expert panel consensus.

## **BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS**

### **POTENTIAL BENEFITS**

- Trauma systems and trauma centers save lives. The Decision Scheme is an essential component of the trauma system, guiding emergency medical services (EMS) providers in transporting injured patients to the most appropriate facility, ensuring proper treatment, and thus reducing death and disability.
- Appropriate and timely critical decisions made by EMS providers increases the likelihood of favorable outcomes for patients.

## **POTENTIAL HARMS**

### **Overtriage and Undertriage**

- Because the potential harm associated with undertriage (i.e., causing a patient in need of trauma-center care not to receive appropriate care) is high and could result in death or substantial morbidity and disability, trauma systems frequently err on the side of minimizing undertriage rather than minimizing overtriage. Target levels for undertriage rates within a trauma system range from 0 to 5% of patients requiring Level I or Level II trauma-center care, depending on the criteria used to determine the undertriage rate (e.g., death and Injury Severity Score [ISS]). Target levels of overtriage vary (approximate range: 25%–50%). As field triage continues to evolve on the basis of new research findings, overtriage rates might be reduced while maintaining low undertriage rates.
- Overtriage results in an overutilization of financial and human resources, can contribute to trauma-center overcrowding, and increases emergency medical services (EMS) transport times and hospital turnaround times. For example, an ambulance that transports a patient with minor injuries unnecessarily to a Level I trauma center 30 miles away instead of to a community hospital 5 miles away is unavailable for a longer period. In a disaster or a situation involving mass casualties, overtriage could have an adverse impact on patient care. A review of data concerning 10 terrorist bombings demonstrated a direct linear relationship between the rate of overtriage and the mortality rate of those critically injured.

## **QUALIFYING STATEMENTS**

### **QUALIFYING STATEMENTS**

The recommendations in this report were developed on the basis of the best evidence available at the time. Limitations in available data clearly indicate the need for additional research. Conducting research in the prehospital environment and in emergency medical services (EMS) presents multiple challenges, including a lack of trained investigators, legal and regulatory barriers, the need for more research among EMS providers, limited funding, and limited infrastructure and information systems to support research efforts.

## **IMPLEMENTATION OF THE GUIDELINE**

### **DESCRIPTION OF IMPLEMENTATION STRATEGY**

Implementation and updating of these protocols at the local level will require a substantial educational and informative effort to ensure wide-scale implementation. The Centers for Disease Control and Prevention (CDC), with additional funding from the National Highway Traffic Safety Administration, is developing an educational toolkit for state and local emergency medical services (EMS) medical directors, state EMS Directors, EMS providers, and public health officials. The tool kit will provide teaching aids to help EMS providers understand why the Decision Scheme was revised and how those revisions can be tailored to the needs of their communities. CDC, through its partner organizations, will distribute the tool kit to EMS jurisdictions throughout the United States. This toolkit also will be available at no charge from CDC at <http://www.cdc.gov/FieldTriage>.

## **IMPLEMENTATION TOOLS**

Clinical Algorithm  
Staff Training/Competency Material  
Tool Kits

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

## **INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES**

### **IOM CARE NEED**

Getting Better  
Staying Healthy

### **IOM DOMAIN**

Effectiveness  
Safety  
Timeliness

## **IDENTIFYING INFORMATION AND AVAILABILITY**

### **BIBLIOGRAPHIC SOURCE(S)**

Sasser SM, Hunt RC, Sullivent EE, Wald MM, Mitchko J, Jurkovich GJ, Henry MC, Salomone JP, Wang SC, Galli RL, Cooper A, Brown LH, Sattin RW, National Expert Panel on Field Triage, Centers for Disease Control and Prevention. Guidelines for field triage of injured patients. Recommendations of the National Expert Panel on Field Triage. MMWR Recomm Rep 2009 Jan 23;58(RR-1):1-35. [160 references]  
[PubMed](#)

### **ADAPTATION**

Not applicable: The guideline was not adapted from another source.



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**GUIDELINE DEVELOPER(S)**

Centers for Disease Control and Prevention - Federal Government Agency [U.S.]

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**GUIDELINE COMMITTEE**

National Expert Panel on Field Triage

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## **FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST**

Centers for Disease Control and Prevention (CDC), their planners, and their presenters wish to disclose they have no financial interests or other relationships with the manufacturers of commercial products, suppliers of commercial services, or commercial supporters with the exception of Jeffrey P. Salomone, who wishes to disclose he received an honorarium as a consultant and on the Advisory Board for Schering-Plough Pharmaceuticals and Stewart C. Wang, who received research grants from General Motors and Toyota Motors while he served as a principal investigator of Grants.

## **GUIDELINE STATUS**

This is the current release of the guideline.

## **GUIDELINE AVAILABILITY**

Electronic copies: Available from the [Centers for Disease Control and Prevention \(CDC\) Web site](#).

Print copies: Available from the Centers for Disease Control and Prevention, MMWR, Atlanta, GA 30333. Additional copies can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325; (202) 783-3238.

## **AVAILABILITY OF COMPANION DOCUMENTS**

The following are available:

- A field triage toolkit containing easy-to-use materials for emergency medical services (EMS) professionals is available from the [Centers for Disease Control and Prevention \(CDC\) Web site](#).
- A Continuing Education activity is available from the [CDC Web site](#).

## **PATIENT RESOURCES**

None available

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